

NIB Network

EUROPEAN NETWORK OF RAIL ACCIDENTS NATIONAL INVESTIGATING BODIES

GUIDANCE ON RAILWAY ACCIDENT AND INCIDENT INVESTIGATION REPORTS

	<i>Drafted by</i>	<i>Reviewed by</i>	<i>Approved by</i>
<i>Name</i>	Task Force 2	NIB Network	NIB Network
<i>Representative</i>	Eva-Lotta Högberg <i>TF2 Chair</i>		Nelson R Oliveira <i>Chair</i>
<i>Date</i>		Adopted at the plenary meeting of 14-FEB-2023	25-ABR-2023

Document History

<i>Version</i>	<i>Date</i>	<i>Comments</i>
0.1	12/05/2022	First draft agreed by the Task Force for NIB consultation.
0.2	04/01/2023	Updated draft after first NIB consultation.
0.3	14/02/2023	Updated draft after second NIB consultation.
1.0	25/04/2023	Version for distributing to NIBs and publishing.

This document was developed by the NIB Network to support the NIBs in their work and is made publicly available for transparency purposes and as a reference for any other interested party.

Any use of it should be made in the adequate context and refer to its title, date and to the NIB Network.

NIB Network

The [European Network of Rail Accidents National Investigating Bodies](#) is an informal network created for the fulfilment of article 22.7 of Directive (EU) 2016/798 of the European Parliament and of the Council, of 11 May 2016, on railway safety, composed of representatives from the bodies in charge of the safety investigation of railway accidents of the European Union Member States plus Norway and Switzerland.

The NIB Network, with the support of the European Union Agency for Railways, undertakes an active exchange of views and experience for the purposes of the development of common investigation methods, drawing up common principles for follow up of safety recommendations and adaptation to the development of technical and scientific progress.

The NIB Network may be contacted at NIB_Network@era.europa.eu

1. Table of content

1.	Table of content	3
2.	Acronyms	4
3.	Intended Users of this Guidance.....	5
4.	Introduction	5
5.	Principles for this Guidance.....	6
6.	The structure to follow on the reporting	6
I.	Summary.....	7
II.	The investigation and its context.....	8
III.	Description of the occurrence	14
a.	The occurrence and background information.....	14
b.	The factual description of the events.....	19
IV.	Analysis of the occurrence, where necessary in respect of individual contributing factors	20
a.	Roles and duties	21
b.	Rolling stock and technical installations.....	25
c.	Human (and organisational) factors.....	26
d.	Feedback and control mechanisms, including risk and safety management as well as monitoring processes	28
e.	Previous occurrences of a similar character, if available	34
V.	Conclusions	34
a.	A summary of the analysis and conclusions with regard to the causes of the occurrence	34
b.	Measures taken since the occurrence.....	35
c.	Additional observations	36
VI.	Safety recommendations.....	36
7.	Annex.....	37

2. Acronyms

AsBo	Assessment Body
CB or CAB	Certification Body
DeBo	Designated Body
EA	European Cooperation for Accreditation
EC	European Community
ECM	Entity in charge of maintenance
ERA	European Union Agency for Railways
EU	European Union
IM	Infrastructure Manager
MS	Member State
NAB	National Accreditation Body
NoBo	Notified Body
NIB	National Investigating Body
NSA	National Safety Authority
RB	Recognition Body
RSD	Railway Safety Directive
RU	Railway Undertaking
SMS	Safety Management System
SSC	Safety Critical Components
TF	Task force

3. Intended Users of this Guidance

Members of national investigating bodies (NIBs).

For information purposes:

- › Members of national safety authorities (NSAs) who are concerned with reports and recommendations by national investigating bodies.
- › Members of the European Union Agency for Railways (ERA) who are concerned with reports and recommendations by national investigating bodies.
- › Members of other bodies who are the subject of reports and recommendations by national investigating bodies (e.g. entity in charge of maintenance (ECM), certification bodies, road authorities, emergency services).
- › The railway undertakings (RUs), infrastructure managers (IMs) and other actors in the railway sector who are interested in the processes of accident investigation.

4. Introduction

This guidance covers the reporting of railway accident and incident investigation as defined by Chapter V of the railway safety directive (Directive (EU) 2016/798).

The basis for the reporting of such investigations is laid by Article 24(1) and (2) of the RSD. Article 24(1) of Directive (EU) 2016/798 states the following:

“An investigation of an accident or incident referred to in Article 20 shall be the subject of reports in a form appropriate to the type and seriousness of the accident or incident and the relevance of the investigation findings. The reports shall state the objectives of the investigations as referred to in Article 20(1) and shall contain, where appropriate, safety recommendations.”

Article 24(2) announces that: “the Commission shall establish [...] the reporting structure to be followed as closely as possible for accident and incident investigation reports.” The remainder of that article lists the elements that the Commission shall include. This was done in Commission Implementing Regulation (EU) 2020/572. The Annex of the regulation contains six titles that forms the main structure.

The use of the reporting structure of (EU) 2020/572 by the investigating body is not mandatory, because Article 24(1) indicates that the form has to be appropriate. For thematic investigations for instance, a different reporting structure can be more appropriate, yet it is still good practice for such reports to consider the elements outlined in the implementing regulation and this guidance.

The goal of this guidance is to promote high quality reporting of railway accident investigations and, by doing so, to improve dissemination of safety information and safety discussions at European level. This guidance tries to achieve a common understanding and a common approach to reporting with the elements of the Annex by all national investigating bodies (NIBs) and simultaneously to give evidence of “good investigating practice”.

For reasons of practicality and traceability, this document follows the sequence and order of the Annex. Let it be clear that the focus of this guidance lies only on the relevant content and purpose of each report element and not on the organisation of the investigation process and not on investigation methods to use.

An accident investigation report should not exclusively comprise an accurate description of circumstances and factors of an accident and the formulation of recommendations to improve railway safety. With regard to demonstration of high level of professionalism and further development of investigation methods, relevant steps of the investigation process applied should be described. This is also important with respect to the scope of an investigation, which in some cases can be limited (ref. Article 24(1) of Directive (EU) 2016/798) and therefore might require adaptation of standard methods and processes. These aspects are covered by chapter 2 (“The investigation and its context”) of the Annex of Regulation (EU) 2020/572.

This Guidance is intended as a support to NIBs in their understanding of Commission Implementing Regulation (EU) 2020/572. It is not intended to give guidance on specific national legislation, neither to be used as a substitute for the RSD or the concerned regulation.

This Guidance is not legally binding.

The guidance will be regularly reviewed by the NIB network and, if necessary, updated to reflect the progress of the European legal acts and standards, as well as to reflect the experience deriving from accident investigation over time. The reader is invited to consult the designated NIB Network webpage for information about the latest available edition of the guidance.

5. Principles for this Guidance

To facilitate the reading of this guidance, the original text of Directive 2016/798 (EU), Commission Implementing Regulation (EU) 2020/572 and other secondary legislation that is applicable at European level, is stated before the corresponding item of guidance and/or integrated in the text. To differentiate this legal text from the guidance, it is presented in *Bookman Old Style* Italic Font, exactly as here.

6. The structure to follow on the reporting

The annex (the structure to follow on the reporting) of 2020/572 states the following:

According to Article 24(1) of Directive (EU) 2016/798, accident and incident reports shall follow as closely as possible the structure here established, adapted to the type and seriousness of the accident or incident. This includes input, in principle, to all titles 1 to 6 including their subtitles in letters, where relevant. Where no relevant information is available or not required due to the circumstances of the occurrence, the statement ‘not applicable’ shall be introduced for the corresponding titles or subtitles, identifying them as not being considered relevant in the context of this investigation. The statement can be done in an aggregated manner either at the beginning or at the end of the relevant title or subtitle.

Good practice:

There is no need to write “not applicable” for every section that is not applicable for a report. At one location in the report all the sections that are not applicable can be mentioned in one or two sentences.

Please note:

The numbering (regular numbers) in the annex of 2020/572 is different from this guidance where roman numerals are used. This has been done in order to keep the same format in all the different guidance documents.

I. Summary

The Annex contains a clear description of what a good summary should include:

The summary is an integral part of the report and shall be self-explanatory so that it can be read without further context. It shall provide an outline of the basic facts of the occurrence: a short description of the accident or incident; when, where and how it happened; and a conclusion on its causes and consequences. The summary shall refer to all factors (causal, contributing and/or systemic) identified by the investigation. Where applicable, the summary shall list the safety recommendations and their addressees.

The summary chapter of the investigation report is meant to be an executive summary of the final report and should as such only contain key facts, causal, systemic and contributing factors, and recommendations and to whom they are addressed. The summary should be concise and easy to read for non-railway experts and aimed at the general public. The length of the summary should be proportional to the size of the report and complexity of the accident / incident. The summary should contain information to quickly understand what happened, when, where, why and how, and who was involved, when read independently.

Good practice:

The summary should in principle quote all recommendations from title VI of the report. When this is not practical, for instance because of a large number of recommendations or long recommendations, some NIBs refer to the scope of the recommendations. For example, maintenance or certification. Safety recommendations related to additional observations can also be grouped in the same manner.

Article 3 of Commission Implementing Regulation (EU) 2020/572 states:

Points 1, 5 and 6 of the Annex I shall be written in a second official European language. This translation should be available no later than 3 months after the delivery of the report.

It is recommended to use English as the second language (if it is not the first), because the aim of this obligation is to improve the dissemination of safety information and lessons learned at European level.

Please note:

If the summary includes the conclusion and recommendations there is no need to translate them separately. When safety recommendations are abbreviated as per the good practice above, the translation should be made on the full text of the recommendations.

II. The investigation and its context

This part of the report shall give the objectives and the context of the investigation. It shall make reference to any factors such as delays that might have detrimental impact or otherwise influence the investigation or its conclusions.

In general, this section of the investigation report aims at displaying that the investigation has been carried out in an independent manner and in accordance with Articles 21(4) and 22(2) of the Directive (EU) 2016/798. This can be done by addressing the elements of the table in the Annex.

Please note:

The intention is to cover the requested information in the report. Therefore, depending on the investigation, the below elements can be grouped. It's not needed to provide the same information at several locations in the report.

	<i>Elements of the table</i>	<i>Application</i>
1.	<i>The decision to establish an investigation:</i>	<i>It is recommended to group these three elements under the same headline, for instance 'decision, motivation and scope'.</i>
2.	<i>The motivation to the decision to establish an investigation, e.g. by reference to Art. 20.1 (serious accident) or Art. 20 (2) a) – d):</i>	
3.	<i>The scope and limits of the investigation including a justification thereof, as well as an explanation of any delay that are considered a risk or other impact to the conduct of the investigation or its conclusions:</i>	

Accident investigation reports, when mentioning the decision to investigate, should not limit the explanation to a simple quote of the legal framework. This is of course important, but the explicit criteria, used to decide to open an investigation, should be cited here as well. For further explanation on these criteria in the context of the RSD we refer to the NIB Network [Guidance on the Decision to investigate accidents and incidents](#). Other national criteria can be used in addition.

Article 20 of Directive 2016/798 describes the obligation the investigating body has to carry out an investigation after any serious accident on the Union rail system. The objective of accident investigation is the possible improvement of railway safety and the prevention of future accidents. Important preconditions are a common understanding of the tasks and obligations for NIBs as given in articles 20 – 26.

Article 20 of Directive 2016/798 describes:

- › the obligation the national investigating body has to carry out an investigation after any serious accident on the Union rail system;
- › the discretion of the NIB to decide on an investigation of all other accidents and incidents.

The scope of the investigation should be mentioned in this part of the report. Firstly, accident investigation reports should state clearly that, in line with the requirements of the RSD, *The investigation shall in no case be concerned with apportioning blame or liability*, Art. 20 (4), and ... *the objective ... is possible improvement of railway safety and the prevention of accidents*, Art. 20 (1). This could be completed with the intended depth (time limitations, available resources ...), width (technical limits, geographical limits ...) and possibly the wider context (previous incidence of this type of occurrence ...) of the investigation.

The NIB has the right to limit the scope of an accident investigation. When this is the case, this should be highlighted in the investigation report and a justification should be given. Also, in accordance with Article 21(2) of the RSD, investigators should be *given access as soon as possible to information and evidence relevant for the investigation*. If this is not the case, and this has impact on the quality of the investigation, this should be reported.

It is stated clearly in the RSD that *The investigation shall be carried out with as much openness as possible ...*, Art. 23, (3). To meet this requirement, it is important that the conduct of the investigation is documented in the investigation report. To do so, and without being exhaustive, the information as specified in the elements (4. to 10.) below could be included in the report.

Good practice:

Some NIBs use a standard text that can be reused and adjusted according to the scope and limitation of each investigation.

Relevant information at a “higher” level should be provided without being exhaustive.

In addition, any decision to limit or even close an opened investigation should also be stated, justified and commented in this section.

4.	<i>An aggregated description of the technical capabilities and the functions in the team of investigators. This includes those belonging to other investigation bodies or external parties involved, as well as evidence for their independence from parties involved in the occurrence:</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

An investigation may involve either a single authority or organisation, or a number of organisations working jointly in various configurations. This should be clearly indicated in the report.

Please note:

Some NIBs consider the final accident investigation report as the product of the entire NIB, and only mention the report as “published by the NIB”. Some NIBs states that investigators trained in accident investigation conducted the investigation, without listing every investigator.

Opposite to this practice of “Branch”-reports, other NIBs explicitly indicate all experts that took part in the investigation, with indication of the “investigator-in-charge”, RSD, Art. 3, (10), and for every investigator at least the indication of his function and the organisation he is working for.

Some national laws and good practice by some NIBs aim to protect the personal data of the investigators.

5.	<i>A description of the communication and consultation process established with persons or entities involved in the occurrence during the investigation and in relation to the information provided:</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

In this part of the investigation report, the NIB can demonstrate compliance with Article 23 (3) of the RSD, where is clearly stated that: *The investigation shall be carried out with as much openness as possible, so that all parties can be heard and can share the results. The relevant infrastructure manager and railway undertakings, the national safety authority, the Agency, victims and their relatives, owners of damaged property, manufacturers, the emergency services involved and representatives of staff and users shall be given an opportunity to provide relevant technical information in order to improve the quality of the investigation report.*

The investigating body shall also take account of the reasonable needs of the victims and their relatives and keep them informed of the progress made in the investigation.

Good Practice:

A general text can be reused and modified in each report. The purpose is to demonstrate the NIBs openness. An overview of the meetings can be provided; there is no need to provide details of every meeting.

Example 1:

A fact-finding presentation meeting with the interested parties was held on 28 October 2021. During this meeting, all the factual data available at that time were presented.

Example 2:

The draft reports are sent to the actors concerned, to allow them to study the draft and to provide their comments on factual information. The conclusions and recommendations are part of the draft final report sent to the actors concerned. The changes accepted by the NIB are then incorporated into the reports.

6.	<i>A description of the level of cooperation offered by the entities involved:</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
-----------	--	---

Despite the need for independence of the investigation, it is good practice to establish a good collaboration with other entities involved. A brief description of the collaboration offered by these entities should be provided in this section of the investigation report.

Please note:

The entities involved in the investigation could be IMs, RUs, ECMs, certification bodies, other authorities, emergency services, other actors in the railway sector, etc.

Special circumstances regarding the openness or problems gathering information may be stated in this section if it affects the conduction of the investigation.

If there are problems gathering information or getting access to information there should be made an effort to solve this with the concerned entity before stating it in the report.

Example 1:

The NIB interviewed and received documentation from the following parties: x, y, z.

Example 2:

All parties cooperated within the investigation.

Example 3:

The NIB did not have access to the site of the accident.

Example 4:

The NIB did not receive all requested documentation in time.

7.	<i>A description of the investigation methods and techniques as well as analysis methods applied to establish the facts and findings referred to in the report. The facts shall at least establish:</i> <ul style="list-style-type: none"> › <i>events and conditions that led to the occurrence;</i> › <i>any precursors that led to the above;</i> › <i>instructions, mandatory procedures, feedback mechanisms and/or control</i> 	<i>e.g. interviews, access to documentation and recordings on the operating system.</i>
-----------	---	---

	<i>mechanisms that led to the occurrence or otherwise played a role regarding it:</i>	
--	---	--

This section of the report should provide a brief description of the methods and techniques that are used to run an in-depth investigation of the accident. This element can support an active exchange of views and experiences for the purposes of the development of common investigation methods, as required by Art. 22 (7) of the RSD.

Example 1:

Information was obtained from the following sources:

- › RU and IM accident investigation
- › technical documentation on rolling stock
- › safety plans, safety cases and relevant documentation
- › results from technical tests
- › legislation, standards and directives
- › managerial agreements
- › minutes from steering groups in the period from 2002-2006

The following research methods were used:

- › interviews with staff from the concerned parties (Party 1, Party 2, ...)
- › analysis of documents (SMS, TSI's, drawings)
- › technical inspection in lab (of aspects U, V and W of components X, Y and Z)
- › technical visit of maintenance workshop
- › examination of accident site

Example 2:

The same content as in Example 1 with the added section:

The following analysis techniques has been used:

- › timeline analysis
- › TRIPOD
- › analysis of actors

Please note:

The bullets in the text of Regulation (EU) 2020/572 just highlight the need to run an in depth-investigation, and do not require to report on the facts and findings in this section.

Please note:

Some NIBs describe the methods and the aspects analysed in the respective chapters where the topic related facts and assessments are made.

8.	<i>A description of the difficulties and specific challenges encountered during the investigation.</i>	
-----------	--	--

Element 8 does not require any further clarification.

9.	<i>Any interaction with the judicial authorities, where appropriate</i>	
-----------	---	--

In this section, the NIB can report on the practical collaboration arrangement that are in place in the case of a parallel investigation run by judicial authorities, and the context created for this in the respective national legal frameworks.

10	<i>Where appropriate, any other information relevant in the context of the investigation.</i>	
-----------	---	--

Element 10 does not require any further clarification.

III. Description of the occurrence

This part of the report shall contain a detailed description of the occurrence mechanism, based on the information collected during the investigation carried out.

a. The occurrence and background information

1.	<i>The description of the occurrence type</i>	
-----------	---	--

The description of the occurrence type should refer to the break-down of accident types as used in Annex I of the RSD:

- › collision of train with rail vehicle,
- › collision of train with obstacle within the clearance gauge,
- › derailment of train,
- › level crossing accident, including accident involving pedestrians at level crossing, and a further break-down for the five types of level crossings defined in point 6.2,
- › accident to persons involving rolling stock in motion, with the exception of suicides and attempted suicides,
- › fire in rolling stock,
- › other.

Please note:

In some cases, it can be fitting to merge elements 1 to 3 into one section.

2.	<i>The date, exact time and location of the occurrence</i>	
-----------	--	--

Example:

date: day of the week, day, month and year

exact time: hour and minutes

location of the occurrence: city or town, type of railway system (rail, metro, light rail), type of location (open line, station, marshalling yard, ... but also e.g. switches and crossing, level crossing, bridge, viaduct, tunnel, plain, line), track number and track kilometre marker, GPS-coordinates.

3.	<i>The description of the occurrence site, including weather and geographical conditions at the moment of the occurrence and if any works were carried out at or in the vicinity of the site:</i>	
-----------	---	--

When relevant to the occurrence, the description of the occurrence site could be completed with pictures, drawings, sketches etc. of the situation after the accident including measurements, as is common practice in car accident investigations. Such a visualisation of the occurrence highly supports an easy understanding of the occurrence.

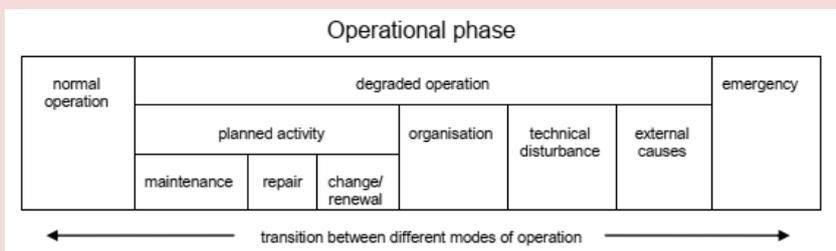
The accident investigation report should provide a brief statement on the general *weather conditions* at the time and place of the occurrence. Only when relevant to the occurrence, the following information could be included: precipitation, snow, avalanches, visibility, wind speed and direction, temperature.

Only when relevant to the occurrence, the following *geographical conditions at the moment of the occurrence* could be included: natural forms and conditions on landscape, platforms, tunnels, cuttings, embankments, track rising and falling gradients, track curvature, track cant deficiency, rail inclination, other visual obstructions, soil conditions, lighting, protection against electric shock.

The intention of considering *works carried out at or in the vicinity of the site*, is to evaluate whether they contributed in setting the stage for the occurrence. Works are not the only source of degraded operations. The transition between different operational phases is a known contributing factor to many occurrences. Therefore, it is suggested to consider also reporting on the operational phase the train was running in.

Good Practice:

The following table could be used to identify the operational phases of the train. It identifies 3 main operational phases, being “normal operation”, “degraded operation” and “emergency operation”. Within the degraded operations, a subdivision is made, following the action causing this degradation, i.e.: “planned activities” (such as “maintenance”, “repair” and “change” or “renewal”), “disturbed organisation”, “technical disturbance” and “external causes”.



4.	<i>Deaths, injuries and material damage:</i> <ul style="list-style-type: none"> › <i>passengers, employees or contractors, level crossing users, trespassers, other persons at a platform, other persons not at a platform,</i> › <i>cargo, luggage and other property,</i> › <i>rolling stock, infrastructure and the environment.</i> 	<i>If anonymity is granted to persons or entities please clarify.</i>
-----------	--	---

Example:

ERAs public database records casualty information in the format as shown in the following table. Therefore, it is recommended that the accident investigation report provides the same information. The format can be adjusted to the circumstances.

	passenger	staff	level Crossing user	unauthorised persons	others
fatality					
serious injury					

In addition, at least a short description and, if available, an estimation of the total cost in euro for the replacement or repair of damaged rolling stock and railway installations should be reported. Those NIBs in MS with a local currency could indicate the currency used in the report, including the actual exchange rate at the date of the accident.

Also damage to the environment has to be taken into account. If available (e.g. from the NSA), this could be extended with the costs that are to be met by RU/IM in order to restore the damaged area to its state before the occurrence. The main cases belonging to this category should be:

- › material damages to an area outside of the railway system;
- › pollution of an area by liquid, solid or gas release of goods;
- › fires in an area inside or outside the railway premises (e.g. fires of trees caused by rolling stock in motion).

Compensation for loss of or damage to property of passengers, staff or third parties should be also included in this section, if known and considered relevant.

5.	<i>The description of other consequences, including the impact of the occurrence in the regular operations of the actors involved</i>	
-----------	---	--

Some NIBs add to their investigation report a paragraph about the consequences of the occurrence. For example: delays caused by the accident and/or other lines that were affected by the accident (including disturbances and re-routing of traffic).

6.	<i>The identification of the persons, their functions, and entities involved, including possible interfaces to contractors and/or other relevant parties</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
-----------	--	---

The investigation report should at least identify all the organisations involved in the accident, and consequently for each organisation, the roles of all staff directly involved, including the following information: function at the moment of the accident and other relevant information of importance for the accident (e.g. experience (only if it's relevant to the investigation), qualifications with date of issue and validity of licence if applicable, history ...). When relevant, other parties and witnesses could be identified in a similar way. Persons' identity must always be protected in accordance with the General Data Protection Regulation (Regulation (EU) 2016/679).

7	<i>The description and identifiers of train(s) and their composition including the rolling stock involved and their registration numbers</i>	
----------	--	--

The investigation report should contain the train number (which will give an indication on the type of traffic), and the composition of the train. When appropriate and relevant, this information could be extended with:

- › for passenger trains, the registration number and type of the locomotive and the number and type of passenger carriages
- › for freight trains, the registration number and type of the locomotive and a list with the registration numbers of all wagons

The presence of dangerous goods should be mentioned since it could give information regarding risk potential. Any further information on train characteristics should only be provided when relevant for the understanding of the mechanism of the occurrence.

Example:

When investigating a derailment, the following characteristics can be relevant for understanding the mechanism of the derailment:

- › *type of train (freight, passenger, mixed);*
- › number of wagons/cars;
- › number of axles;
- › type of the wagons/cars;
- › type of traction (electric, diesel, hybrid);
- › gauge;
- › condition of the wagons: loaded, empty;
- › train length;
- › net mass of the train;
- › gross mass of the train;
- › braked mass of the train (automatic, by hand).

The list above is non-exhaustive.

8.	<i>A description of the relevant parts of the infrastructure and signalling system – track type, switch, interlocking, signal, train protection systems</i>	
----	---	--

The NIBs have different reporting practices. An appropriate form for reporting the technical issues, when relevant for the understanding of the mechanism of the occurrence, is provided:

- › *track types*: rail type (incl. rail head profile, design linear mass, steel grade), type of rail fastening system, type of track sleepers and bearers, type of embankment and reference speed
- › *switches*: type of points and means of detection and locking
- › *interlocking*: category of interlocking (mechanical, relays based, electronic), type of
- › *control-command system and type of train detection system* (track circuit, axle counters, on board equipment)
- › *signals*: unique signal number and type of signal (mechanical or light)
- › *train protection*: category (class A or class B, with mention of type)

9.	<i>Where appropriate, and any other information relevant for the purpose of the description of the occurrence and background information</i>	
-----------	--	--

It falls within the discretion of the NIB to decide whether also other elements that influenced the mechanism of the occurrence should be reported upon, taking into account the objective of this chapter.

b. The factual description of the events

The reconstruction of an occurrence is a transition phase between the immediate reporting of an occurrence and the subsequent analysis that identifies the causal factors, which lead to the occurrence. The purpose of this step is to describe how the occurrence happened. The output should be a description of the events, adequately supported by evidence, which clearly explains the sequence and relationship between events that led up to the occurrences and effectively the outcome.

1.	<i>The proximate chain of events leading up to the occurrence, including:</i> <ul style="list-style-type: none"> › <i>actions taken by persons involved,</i> › <i>the functioning of rolling stock and technical installations,</i> › <i>the functioning of the operating system</i> 	<i>e.g. starting point of a train ride, beginning of the shift of an involved staff member e.g. measures taken by staff for traffic control and signalling, exchange of verbal messages and written orders in connection with the occurrence</i> <i>e.g. signalling and control command system, infrastructure, communications equipment, rolling stock, maintenance, etc.</i>
-----------	---	---

The objective is to enable the reader to fully understand how the accident happened. The occurrence itself should also be described as part of the chronology. The information presented in the report should be based on established facts. Evidence which facilitated the reconstruction of the sequence of events should be mentioned. Any part or system which had a bearing on the accident as well as operational procedures, performance limitations and other circumstances which played a role in the accident should be reported. If needed, some simple explanation of mechanisms or phenomena involved should be given at this section, even before the analysis (example, why excessive twist leads to the loss of guidance by a wheel).

2.	<i>The chain of events from the occurrence until the end of the actions of the rescue services, including:</i> <ul style="list-style-type: none"> › <i>measures taken to protect and safeguard the site of the occurrence,</i> › <i>the efforts of the rescue and emergency services.</i> 	<i>e.g. trigger of the railway emergency plan, trigger of the emergency plan of the public rescue services, the police and the medical services and its chain of events</i>
-----------	---	---

The management of railway emergencies in accordance with point 5.5 Annex I and II from Regulation 2018/762, is an important control measure to limit or reduce the consequences of an occurrence. Therefore, all railway organisations must set up a railway emergency plan identifying and specifying the different types and levels (critical, non-critical etc.) of emergencies that might occur. Each plan should be periodically reviewed to ensure that it is up to date and it should provide the details of the actions, alerts and information to be given in case of an emergency. For each type of emergency, the plan should clearly identify and define:

- › *the different parties and or staff interested/involved;*
- › *the interfaces between RU, IM and relevant public authorities;*
- › *the reference to the relevant emergency processes and procedures.*

If it appears relevant for the consequences to the accident under investigation, the investigation report should contain an evaluation of the internal (railway) and external (public) emergency plan. Similar to what is done for the analysis of the proximate chain of events leading up to the occurrence, also these emergency plan should be further analysed to detect underlying and organisational factors that can explain their (dis-) functioning.

IV. Analysis of the occurrence, where necessary in respect of individual contributing factors

Please note:

Some NIBs have excluded the second part of the heading text in their reports in order to make the heading easier to understand for the reader. The intention of the heading text is to explain that this is the section where the occurrence and contributing factors are analysed.

This part of the report shall analyse the established facts and findings (i.e. performance of operators, rolling stock and/or technical installations) which caused the occurrence. The analysis shall lead to the identification of the safety critical factors that caused or otherwise contributed to the occurrence, including facts identified as precursors. An accident or incident may be caused by causal, systemic and contributing factors which are equally important and should be considered during an investigation.

In this phase, the aim is to describe the analysis and all the reasons why the occurrence took place in the way that it did, starting from the assumed occurrence scenario – based on the evidence known at that moment.

The analysis may be extended to conditions, feedback mechanisms and/or control mechanisms throughout the entire railway system that were identified as actively influencing the development of similar occurrences. This could comprise the functioning of safety management systems of involved parties and regulatory activities covering certification and supervision.

The RSD imposes the establishment of an SMS and defines it in Art. 3 (9) as *the organisation, arrangements and procedures established by an infrastructure manager or a railway undertaking to ensure the safe management of its operations*. Moreover, the SMS is the subject of assessment, by ERA or the National

Safety Authority, before any safety certification or authorisation is granted and of further supervision activities by the National Safety Authorities to ensure the effectiveness of the SMS. Since this approach forms the cornerstone for the sustainable management of railway safety in Europe, analysing the performance and effectiveness of these elements, in what relates to the occurrence, should form an integral part of a well-run accident investigation, in order to identify possible 'systemic factors' that contributed to the accident under investigation.

Although the SMS should be an important factor of investigations, the systemic factors are not limited to SMS elements. The systemic factors include organisational, managerial, societal or regulatory aspects that are likely to affect similar and related occurrences in the future.

Please note:

The NIB should only describe the part of the safety management system that is linked with the accident and the risk evaluation made by the involved parties (RU, IM, ECM).

The following items shall be covered for each of the identified events or factors (causal or contributing) that appear safety critical, in line with the flexibility offered by the structure (see above).

In general, the order of the numbered titles and subtitles in letters shall be respected by the investigating bodies when drafting investigation reports. In this section however, due to the potential complexity of the accident or incident under investigation and the unpredictability of the investigation findings, no mandatory structure is imposed. It is however recommended, to structure this section around the events that have a causal relationship with the accident. The items below form a good check-list to ensure that all relevant topics are covered in the analysis.

a. Roles and duties

Without prejudice to Article 20(4) of Directive (EU) 2016/798 this part of the report shall lead to the identification and analysis of roles and duties of individual persons and entities, including if necessary relevant staff and their defined tasks and functions, identified as having been involved in the occurrence in a safety critical manner, or any activity leading to it.

This part of the report should allow the identification of the roles and duties of the involved parties including the interfaces to the roles and duties of contractors and other relevant parties, the roles of staff and their roles and duties within the railway system, as documented in the relevant management systems and/or regulatory framework. The following figure provides a general overview of the main EU railway stakeholders and the existing relations between them. The figure can be used by the NIB as a help to identify stakeholders and relationships between the stakeholders of relevance for the investigation.

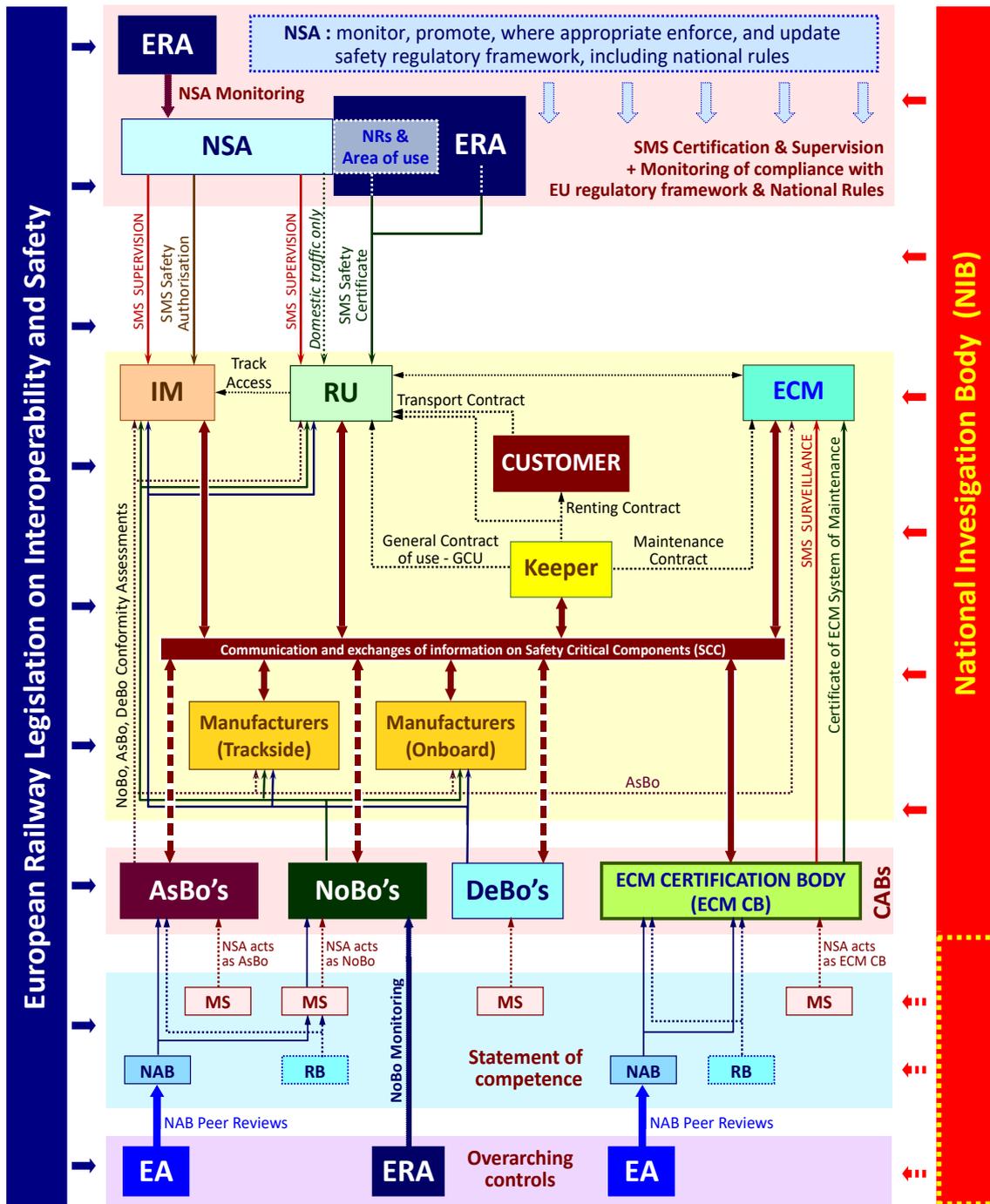


Figure 1: General overview of the main EU railway stakeholders and the existing relations between them.

1.	Railway undertaking(s) and/or infrastructure manager(s)	If anonymity is granted to persons or entities please clarify.
----	---	--

The RSD, in its Article 4 (e), is very clear that *each infrastructure manager and each railway undertaking is (made) responsible for its part of the system and its safe operation, including supply of materials and contracting of services vis-à-vis users, customers, the workers concerned and other actors.*

2.	<i>The entity/entities in charge of maintenance, the maintenance workshops, and/or any other maintenance suppliers</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

In accordance with the RSD, Article 14, 1: *each vehicle, before it is being used on the network, shall have an entity in charge of maintenance assigned to it.* The same article further details the functions to be covered by such an entity in charge of maintenance (ECM), while Commission Implementing Regulation (EU) 2019/779 specifies the conditions and requirements to be respected for the certification of ECM.

3.	<i>Manufacturers of rolling stock or other supplier of rail products</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

Article 2 (36), of the Interoperability Directive (EU) 2016/797 defines ‘manufacturer’ *as any natural or legal person who manufactures a product in the form of interoperability constituents, subsystems or vehicles, or has it designed or manufactured, and markets it under his name or trademark.*

When designing a new type of vehicle, the manufacturer should determine the criticality of the functions and components of their products by a risk-based analysis and record them in the technical file referred to in Article 15 (4) of Directive (EU) 2016/797 on the interoperability of the railway system. The determination of the criticality should take into account how the component is intended to be used and the environment in which it will be used. The entity in charge of maintenance should have access to the relevant parts of the technical file to ensure it is fully aware of the criticality of the components for each type of vehicles under its roles and duties.

The entity in charge of maintenance should identify criticalities by observing and analysing the failures and tracing all its interventions and be obliged to provide information at least on the safety-critical components identified as such by the manufacturer. Where the entity in charge of maintenance considers that new safety-critical components should be included in the technical file or components should be reclassified as non-safety-critical, it should promptly inform the manufacturer, the holder of the vehicle type authorisation and the holder of the vehicle authorisation to allow taking the necessary measures, including a revision of the technical file, if needed.

4.	<i>National safety authorities and/or the European Union Agency for Railways</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

National Safety Authorities (NSA) play an important role in guaranteeing the overall safety of the railway system. The RSD, in Art. 16, specifies the role and sums up the safety related tasks an NSA shall be entrusted with. See annex 1.

The establishment of the European Union Agency for Railways, on the other hand, is regulated through Regulation (EU) 2016/796. With the implementation of the 4th Railway Package, the Agency has been given a more active role in the railway system. See annex 1.

5.	<i>Notified bodies, designated bodies and/or risk assessment bodies</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	---	---

According to Article 2, (43) of the Interoperability Directive, (EU) 2016/797,

‘conformity assessment body’ means a body that has been notified or designated to be responsible for conformity assessment activities, including calibration, testing, certification and inspection; a conformity assessment body is classified as a ‘notified body’ following notification by a Member State; a conformity assessment body is classified as a ‘designated body’ following designation by a Member State.

Notified and designated bodies play a role in certifying the intrinsic conformity of railway constituent and/or subsystems, considered either in isolation or within its railway environment, to the technical or functional specifications laid down in respectively a Technical Specification for Interoperability (TSI) in the case of a notified body or national rules in the case of a designated body.

Commission Implementing Regulation (EU) No 402/2013, better known as the CSM on Risk Assessment, on the other hand, defines in Article 3 (16) ‘assessment body’ as *the independent and competent external or internal individual, organisation or entity which undertakes investigation to provide a judgement, based on evidence, of the suitability of a system to fulfil its safety requirements.*

In summary, an assessment body shall carry out an independent assessment of the suitability of both the application of the risk management process as set out in Annex II of the above cited CSM RA and of its results, in case a proposed change to the railway system that impacts safety is considered as significant.

6.	<i>Certification bodies of entities in charge of maintenance mentioned under 2</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	--	---

Commission Implementing Regulation (EU) 2019/779, on the certification of ECM, defines ‘certification body’ as *a body, responsible for the certification of entities in charge of maintenance or for certification of the entity or organisation that fulfil maintenance functions referred to in points (b), (c) or (d) of Article 14(3) of Directive (EU) 2016/ 798, or parts of those functions*

The assessment by a certification body of an application for an ECM certificate is an assessment of the applicant's ability to manage maintenance activities and to deliver the operational functions of maintenance either by itself or through contracts with other bodies, such as maintenance workshops, charged with delivering those functions or parts of those functions.

7.	<i>Any other person or entity relevant to the occurrence, documented or not in one of the relevant safety management systems or referred to in a register or relevant legal framework</i>	<i>If anonymity is granted to persons or entities please clarify.</i>
----	---	---

This requires no further explanation. Any actor whose actions or decisions influenced the accident under investigation in a direct or indirect way, could be investigated. When this is the case, their roles and duties should be clearly specified in the investigation report.

Example:

Other entities could be keepers of vehicles, terminal providers, loaders or fillers.

b. Rolling stock and technical installations

Causal factors to or the consequences of an occurrence that were identified as relating to the condition of rolling stock or technical installations, including possible contributing factors related to activities and decisions such as (detailed below).

A robust system for asset management should be in place which reflects the risks that are posed by the type and extent of its operations. In this context, 'Asset' means any equipment (fixed or mobile), structure, software or any other component which requires maintenance over time provided for the purposes of running a railway operation.

Assets will be divided into those managed by the railway undertaking, ECM and those managed by an infrastructure manager. A complete list of railway infrastructure assets is provided in Annex I of the Directive (EU) 2012/34.

The lifecycle of an asset entails the following phases that are also (partly) reflected in the elements of Regulation (EU) 2020/572:

- a) Design (incl. definition of the system and its application conditions, analysis of risks, identification and apportionment of system requirements);*
- b) Implementation (incl. construction/ manufacturing, installation, testing and commissioning);*
- c) Operation and maintenance;*
- d) Repair, modification and retrofit, involving the management of changes;*
- e) Renewal, decommissioning and disposal.*

It is important for an organisation to demonstrate how it captures and maintains (system and) safety requirements for assets, and how these will be verified, validated, and tracked.

If maintenance is contracted to a third party, it is the organisation's roles and duties to specify and monitor that the performance of the asset complies with the organisation's established standards. Once processes are in place to manage the risk associated with safety critical assets, the organisation should monitor asset performance against these risks and its own expectations. All parties involved in the maintenance process such as railway undertakings, infrastructure managers, keepers, entities in charge of maintenance, as well as manufacturers of vehicles, subsystems or components, shall exchange relevant information about maintenance in accordance with the criteria listed in Sections I.7 and I.8 of Annex II of Commission Implementing Regulation (EU) 2019/779.

Where assets are likely to be renewed, decommissioned, or disposed of, the organisation establishes and documents processes to manage any risks associated with such activities.

1.	<i>Stemming from the design of the rolling stock, railway infrastructure or technical installations</i>	
2.	<i>Stemming from the installation and taking into service of the of rolling stock, railway infrastructure or technical installation</i>	
3.	<i>Laying with the manufacturers or other supplier of rail products</i>	
4.	<i>Stemming from the maintenance and/or the modification of the rolling stock or technical installations</i>	
5.	<i>Laying with the entity in charge of maintenance, the maintenance workshops and other maintenance suppliers</i>	
6.	<i>And any other factors or consequences considered relevant for the purpose of the investigation</i>	

c. Human (and organisational) factors

To comply with current legislation, railway organisations must demonstrate a systematic approach to integrating and managing Human and Organisational Factors (HOF) within the SMS. HOF is a multidisciplinary field focusing on how to increase safety, enhance performance as well as increase user satisfaction. According to the International Ergonomics Association, “ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and other methods to design in order to optimize human well-being and overall system performance”. (note: further information is available at: https://www.era.europa.eu/activities/safety-management-system/human-and-organisational-factors-hof_en)

HOF integrates knowledge in social sciences such as Management Science, Psychology, Sociology, Design Science, Political Science, to enlarge the scope of study and investigation while considering organisational, institutional, cultural or political contributors to safety. Different models exist to represent HOF and the grouping in this Regulation offers just one of the possibilities. It highlights that an individual’s behaviour may be influenced by personal elements, the organisation of their work and the design of machines, equipment, software and workspaces, the organisation and the environment (the physical world) they are working in.

The contemporary view of human behaviour and performance is that human error is not the cause of failure - rather it is an effect or symptom of a deeper trouble. After an accident has occurred focus must therefore

extend beyond ‘...what occurred?’ to ‘...why did it occur?’. This particularly applies to accident investigation where priority must be placed on understanding why errors occurred or why personnel behaved in an unexpected manner.

The aim (and the challenge) of investigating human performance, is therefore to find out how peoples’ assessments and actions made sense at the time, given the circumstances that surrounded them. The data that needs to be gathered therefore should cover all possible features of the system and situation that surrounded people at the time and with which they interacted. Furthermore, this is not only valid for decisions and actions of operational personnel but should encompass all of the people concerned with the occurrence and/or performance under investigation, which could easily lead to the investigation of activities and decisions away from the occurrence in space and time.

Where causal or contributing factors or the consequences of an occurrence were related to human actions, attention shall be paid to the particular circumstances and the manner in which routine activities are performed by staff during normal operations and the human and organisational factors that may influence actions and/or decisions, including:

1.	<i>Human and individual characteristics: (a) training and development, including skills and experience, (b) medical and personal circumstances with influence on the occurrence, including existence of physical or psychological stress, (c) fatigue, (d) motivation and attitude.</i>	
2.	<i>Job factors (a) task design, (b) design of equipment with impact on the man-machine interface, (c) the means of communication, (d) practices and processes, (e) operating rules, local instructions, staff requirements, maintenance prescriptions and applicable standards, (f) working time of the staff involved, (g) risk handling practices (h) context, machinery, equipment and instructions shaping work practices.</i>	

<p>3.</p>	<p><i>Organisational factors and assignments:</i> <i>(a) workforce planning and workload,</i> <i>(b) communications, information and team working,</i> <i>(c) recruitment and selection, resources,</i> <i>(d) performance management and supervision,</i> <i>(e) compensation (remuneration),</i> <i>(f) leadership, power issues,</i> <i>(g) organisational culture,</i> <i>(h) legal issues (incl. relevant EU and national rules and regulations),</i> <i>(i) the regulatory framework conditions and the application of the safety management system.</i></p>	
<p>4.</p>	<p><i>Environmental factors:</i> <i>(a) working conditions (noise, lighting, vibrations, ...),</i> <i>(b) weather and geographical conditions,</i> <i>(c) works carried out at or in the vicinity of the site.</i></p>	
<p>5.</p>	<p><i>And any other factor relevant for the purpose of the investigation in the above points (1), (2), (3), (4)</i></p>	

d. Feedback and control mechanisms, including risk and safety management as well as monitoring processes

In order to ensure that the railway system is built with safe and interoperable products and sub-systems, and operated and maintained safely, the European railway legislation contains a layered system of controls, performed by different actors. The aim of an investigation is not to assess the entire SMS of concerned operators nor the entire regulatory framework and/or its correct implementation. A good and in-depth safety investigation, that aims at improving the safety of the railway system in a sustainable way, should however analyse the functioning of the different hierarchical control levels in the SMS (and beyond), as far as they can be linked to initial findings close to the sequence of events, that explains the accident under investigation.

<p>1.</p>	<p><i>The relevant regulatory framework conditions</i></p>	
------------------	--	--

For the actors represented in the figure under section ‘4.4.1 (a) roles and duties’, the existing regulatory framework contains the following control mechanisms or control loops:

Stakeholder	Control mechanisms
Direct contributors to railway interoperability and railway safety	
RU	SMS certification by ERA/NSA Internal monitoring part of the SMS processes SMS supervision by NSA Where applicable, conformity assessments by NoBo, DeBo, AsBo
IM	SMS authorisation by NSA Internal monitoring part of the SMS processes SMS supervision by NSA Where applicable, conformity assessments by NoBo, DeBo, AsBo
ECM	Certification of maintenance system by ECM CB Internal monitoring part of processes of the maintenance system Surveillance of maintenance system by ECM CB Where applicable, conformity assessment by an AsBo
Manufacturer	No legal obligation for a certified management system Usually voluntary ISO 9001 certification Where applicable, conformity assessments by NoBo, DeBo, AsBo Vehicle authorisation for placing on the market in compliance with Regulation 2018/545
Regulating and controlling actors	
ERA	No legal obligation for a certified management system Supervision by Agency management board vs. a referential owned by the management board Voluntary ISO 9001 certification
Member State	Check by the European Commission of the correct transposition and implementation of European railway legislation
NSAs	Established under full control and responsibility of Member State NSA monitoring by ERA
CABs	Dependent on the option(s) chosen by the Member State
ECM CB	Accreditation or recognition, except if NSA acts as ECM CB Supervision by NAB or RB

Stakeholder	Control mechanisms
NoBo	Notification by Member State based on a beforehand accreditation or recognition, except if NSA acts as NoBo Supervision by NAB or RB NoBo monitoring by ERA
DeBos	Designation under full control and responsibility of the Member State
AsBos	Accreditation or recognition, except if NSA acts as ECM CB Supervision by NAB or RB
NAB	Peer evaluations between NABs under coordination of EA
Recognition Body	Nothing whereas there shall be at least peer evaluations between RBs in charge of recognition of AsBos
EA	Not applicable
NIB	Peer evaluations between NIBs

Since all actors to some degree contribute to a safe railway system, any weakness in their functioning can directly or indirectly influence the safety of operational activities and could consequently be part of the investigation after an accident.

2.	<i>The processes, the methods, the content and the results of risk assessment and monitoring activities, performed by any of the involved actors: railway undertakings, infrastructure managers, entities in charge of maintenance, maintenance workshops, other maintenance providers, manufacturers and any other actors, and the independent assessment reports referred in Article 6 of Implementing Regulation (EU) No 402/2013 ¹</i>	
-----------	---	--

Commission Implementing Regulation (EU) 402/2013, establishing a common safety method (CSM) for risk evaluation and assessment, shall apply to the proposer (i.e. RU, IM, ECM, a contracting entity or a manufacturer and an applicant for an authorisation for the placing in service of structural sub-systems) when making any change to the railway system in a Member State. Such changes may be of a technical, operational

¹ *Implementing Regulation (EU) No 402/2013 of 30 April 2013 on the common safety method for risk evaluation and assessment and repealing Regulation (EC) No 352/2009 (OJ L 121, 3.5.2013, p. 8)*

or organisational nature. Only the organisational changes that could impact the operational or maintenance processes shall be subjected to consideration. The proposer shall ensure that risks introduced by its suppliers and its service providers, including their subcontractors, are also managed in compliance with this Regulation.

To this end, the proposer may require through contractual arrangements that its suppliers and its service providers, including their subcontractors, participate in the risk management process set out in Annex I of Regulation (EU) 402/2013. When relevant, the existence of such contractual arrangements and/or the adequate fulfilment of specified requirements can be part of the investigation.

3.	<i>The safety management system of the involved railway undertaking(s) and infrastructure manager(s) including the basic elements stated in Article 9(3) of Directive (EU) 2016/798 and any EU legal implementing acts</i>	
4.	<i>The management system of the entity/ entities in charge of maintenance and maintenance workshops including the functions stated in the Article 14(3) and Annex III of Directive (EU) 2016/798 and any subsequent implementing acts</i>	

This first level of control is mandatory for stakeholders subject to the obligation of having in place a certified management system (i.e. RUs, IMs, and ECMs).

According to Regulation 2018/762 on the CSM for SMS, and the ECM Regulation 2019/779, the RU/IM/ECM management system must contain “internal control mechanisms”, known as “internal monitoring”. The monitoring processes and procedures of the RU/IM/ECM management system must comply with the Commission Regulation (EU) No 1078/2012 on the CSM for monitoring.

The other railway actors (e.g. manufacturers which usually voluntarily have an ISO 9001 quality management system certification) are not legally obliged to have a certified management system in place. For some stakeholders, requirements for internal monitoring procedures and processes can indirectly be requested through the mandatory standards, applicable to the considered actor. For example, the ISO/IEC 17020:2012 standard applicable to the AsBos requires the AsBo companies to have internal monitoring processes.

When reporting on the investigation of a SMS it is good practice to refer to Regulation 2018/762 that specifies the requirement for certification of SMS. An investigation is not an audit, and the report should only explain the parts that are relevant for the occurrence.

5.	<i>The results of supervision performed by the national safety authorities in accordance with Article 17 of Directive (EU) 2016/798</i>	
-----------	---	--

A next level of control, i.e. supervision/surveillance of the management system, ensures that the considered actor continually, effectively and correctly applies the provisions of its management system, taking any necessary corrective, or preventive, measures in case a non-compliance is detected.

Regardless of whether the safety certification is carried out by ERA or an NSA:

- (a) the NSA is responsible for the supervision of the continual, effective and correct application of the provisions in the SMS's of RUs and IMs operating in their country;
- (b) the ECM Certification Body is responsible for the surveillance of the continual, effective and correct application of the provisions in the maintenance system of the ECM it certified.

6.	<p><i>The authorisations, certificates and assessment reports granted by the Agency, the National Safety Authorities or other conformity assessment bodies:</i></p> <ul style="list-style-type: none"> › <i>Safety authorisation/ safety certificates of the involved infrastructure manager(s) and railway undertaking(s),</i> › <i>Authorisations for the placing in service of fixed installations and vehicles</i> › <i>authorisations for placing on the market,</i> › <i>Entity in charge of maintenance and maintenance workshops (incl. certification)</i> 	
-----------	--	--

The certification of a management system confirms formally the capability of the considered actor to manage safely its business, including the actor's capability to monitor internally the correct implementation, and the effectiveness, of the management system provisions.

Depending on the actor, the operations, and where relevant, on the choice of the Member State, the certification is done by:

- (1) ERA, with the support of relevant NSAs, for cross-border operations, or for domestic operations if the RU applies to ERA;
- (2) the NSA for domestic operations only, if the RU applies to the NSA;
- (3) ECM Certification Body for an ECM.

7.	<i>Other systemic factors</i>	
----	-------------------------------	--

Other levels of control exist.

Where needed, an assessment of conformity with the applicable EU rules, National Rules (NRs) and safety legislation by relevant conformity assessment bodies (CABs) is required. The following conformity assessment bodies are defined in the EU railway legislation:

- (1) NoBo;
- (2) DeBo;
- (3) AsBo;
- (4) ECM Certification Bodies (ECM CBs)

Depending on the choice of the Member State where the CABs are located, statement of competence of CABs is done as follows:

- (1) NoBo are notified by the Member State based on a beforehand accreditation or recognition, except if the Member State entitles the NSA to act as NoBo;
- (2) DeBo are designated under the full control and responsibility of the Member State;
- (3) AsBo are accredited by the NAB, or recognised by the NSA, except if the Member State entitles the NSA to act as AsBo;
- (4) ECM CBs are accredited by the NAB, or recognised by the NSA, except if the Member State entitles the NSA to act as ECM CB;

Normally accreditation and recognition automatically imply a regular surveillance of the CABs to ensure that the CABs keep their competence, and continually and effectively carry out the conformity assessments that are in the scope of their accreditation/recognition. The use of accreditation, and the obligation of the national accreditation bodies to comply with section § 7.9 of the ISO/IEC 17011 standard, guarantees that such regular surveillance of CABs takes place. However, when the CABs in bullet point (4) above are recognised, there is not any visibility and knowledge on whether the accountable recognition bodies (usually NSAs) carry out such regular surveillance (see next bullet point);

In addition, a set of overarching controls exist, ensuring consistency across EU Member States:

- (1) Article 33 of the 4th Railway Package Agency Regulation 2016/796 requests ERA to monitor the performance and decision-making of NSAs through audits and inspections. This includes the monitoring of the effectiveness of the supervision by NSAs of safety management systems of RUs and IMs;
- (2) Article 16(2)(i) of Safety Directive 2016/798 requires the NSAs to monitor, promote, and, where appropriate, enforce and update the safety regulatory framework including the system of national rules;
- (3) in order to ensure the equivalence of the level of competence of conformity assessment bodies across the EU, to facilitate mutual recognition and to promote the overall acceptance of accreditation certificates and conformity assessment results issued by accredited bodies, the European Cooperation for Accreditation (EA) organises regularly a system of rigorous and transparent Peer Evaluations between the national accreditation bodies. Those provisions provide the assurance of equivalence

between accredited AsBos (ECM Certification Bodies) regardless the country where the AsBos (ECM Certification Bodies) are accredited;

- (4) although Article 14(1) of Regulation No 402/2013 on the CSM for risk assessment requires ERA to organise similar peer evaluations between the AsBo recognition bodies, this could not be put in place.

e. Previous occurrences of a similar character, if available

Investigations should not only consider the particular occurrence being investigated but should also identify, when possible, whether there have been any previous occurrences with similar causal and contributing factors in their own country and also in other EU member states. This general overview of the context of an occurrence can help strengthen acceptance of recommendations from the investigation, and should therefore be mentioned in the accident investigation report. However, the relevance of any previous occurrence should be clear.

Good Practice:

Some NIBs introduce the previous occurrences before the analysis chapter.

V. Conclusions

The conclusions shall contain:

a. A summary of the analysis and conclusions with regard to the causes of the occurrence

The conclusions shall summarise the identification of the causal and contributing factors to the occurrence, including both immediate and deeper systemic factors, as well as missing or inadequate safety measures for which compensatory measures are recommended. Moreover, it shall refer to the capability of the involved organisations to address this via their safety management systems, in order to prevent future accidents and incidents.

Please note:

In this chapter some NIBs explain how they arrive to the conclusions and then introduces the causal and contributing factors. Sometimes the conclusions are self-explanatory and no introduction is needed. Some NIBs only describe the causal and contributing factors in this chapter in order to not repeat text from the Analysis chapter.

The regulation text *Moreover, it shall refer to the capability of the involved organisations to address this via their safety management systems, in order to prevent future accidents and incidents* refers to a summary of the analysis on the investigated parts of the SMS, identifying why the organisation was not capable of detecting and solving the problem before it became an accident

The RSD (Art 3, (15)) defines „causes” as *actions, omission, events or conditions, or a combination thereof, which led to the accident or incident*. If eliminated or avoided, these causes would have mitigated the resulting injuries or damage.

The Commission Implementing Regulation (EU) 2020/572, introduces in Article 2 the following definitions:

(1) **‘causal factor’** means any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood;

(2) **‘contributing factor’** means any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence;

(3) **‘systemic factor’** means any causal or contributing factor of an organisational, managerial, societal or regulatory nature that is likely to affect similar and related occurrences in the future, including, in particular the regulatory framework conditions, the design and application of the safety management system, skills of the staff, procedures and maintenance.

The introduction of these definitions recognises the idea that there is no such thing as a root or primary cause but that accidents rather are the result of multiple factors that may interact in different ways. Furthermore, a strict categorisation according to these definitions is not required as part of the reporting.

All conclusions should be based on a thorough, impartial and objective analysis of all the available evidence. No new information should be introduced in the conclusions. Any condition, act or circumstance that created the context in which the accident took place, should however be clearly identified. Significant events and factors that were investigated in detail, but eliminated as possible causes in the analysis, should also be stated in the report, just as areas of ambiguity. When there is insufficient evidence to establish why an accident occurred, there should be no hesitation in stating that causes remain undetermined.

b. Measures taken since the occurrence

To be able to complete this section presupposes some form of consultation with relevant parties during the investigation process. From the start of the investigation, NIBs should encourage relevant parties to provide information on any measures taken since the occurrence in order to address the causal and contributory factors that led to the occurrence.

Most if not all countries provide for a formal consultation phase on the draft report. This should give relevant parties a final opportunity to inform of measures taken. This information should be taken into consideration by the NIB to assess if any intended safety recommendation is still necessary.

However, NIBs should only dismiss making a safety recommendation based on measures taken if it is satisfied with the evidence of its implementation.

c. Additional observations

Safety issues identified during the investigation, but without relevance to the conclusions on causes and consequences of an occurrence.

During railway accident investigations, issues related to safety are often identified which did not contribute to the investigated occurrence but which, nevertheless, are safety deficiencies. These safety deficiencies should be reported in the accident investigation report.

Good Practice:

Some NIBs identify the additional observations in the factual or analysis chapters while the conclusions regarding the additional observations are made in this section.

VI. Safety recommendations

A safety recommendation is a non-mandatory, public, formal and documented proposal of a NIB based on the information and analysis derived from an investigation of an accident or incident, made solely with the intention to prevent accidents and incidents, in no case intended to create a presumption of blame or liability.

The guidance on [safety recommendations](#) is providing further information and examples to facilitate a common understanding of the handling of safety recommendations from railway accident/incident investigations across the European Union.

7. Annex

The RSD, in Art. 16, specifies the role of the National Safety Authorities (NSA) and sums up the safety related tasks an NSA shall be entrusted with.

Each Member State shall establish a national safety authority. Member States shall ensure that the national safety authority has the necessary internal and external organisational capacity in terms of human and material resources. That authority shall be independent in its organisation, legal structure and decision-making from any railway undertaking, infrastructure manager, applicant or contracting entity and from any entity awarding public service contracts. Provided that such independence is guaranteed, that authority may be a department within the national ministry responsible for transport matters.

The safety related tasks include: *authorising the placing in service of the trackside control-command and signalling, energy and infrastructure subsystems, (supporting the Agency in) the issuing, renewal, amendment and revocation of single safety certificates, monitoring, promoting, and, where appropriate, enforcing and updating the safety regulatory framework including the system of national rules and supervising railway undertakings and infrastructure managers.*

Regulation (EU) 2016/796 specifies the European Union Agency for Railways role in the railway system, including: *issue, renew, suspend and amend single safety certificates and cooperate with national safety authorities in that respect, issue authorisations for the placing on the market of railway vehicles, and shall be empowered to renew, amend, suspend and revoke authorisations issued by it and check, before any call for tenders relating to ERTMS trackside equipment, that the technical solutions are fully compliant with the relevant TSIs and are therefore fully interoperable, and take a decision for approval.*